

## Diesel Engine Retrofit Fact Sheet

Emissions can be significantly reduced from existing diesel engines. Various types of after treatment devices are available and have been proven to reduce particulate matter (PM), hydrocarbons (HC), and carbon monoxide (CO). The Georgia Environmental Protection Division (EPD) only recommends products that have been verified/certified by the US Environmental Protection Agency (EPA) and the California Air Resource Board (CARB). Listed below are several types of after treatment devices. For a complete list please check the EPA voluntary diesel retrofit webpage or the CARB Diesel Reduction Program, verified technology webpage at [www.epa.gov/otaq/retrofit](http://www.epa.gov/otaq/retrofit) or [www.arb.ca.gov/diesel/verdev/verdev.htm](http://www.arb.ca.gov/diesel/verdev/verdev.htm).

**Crankcase filter (CCF):** Crankcase filters are placed at the blow-by valve of a diesel engine. The filters capture the crankcase emissions and filters out the oil. The oil is placed back in the oil pan and the remaining exhaust is sent to the tailpipe. The use of a crankcase filter significantly reduces PM emissions inside the vehicle. The core filters must be replaced yearly.

**Diesel Oxidation Catalyst (DOC):** This is a replacement for the muffler of a vehicle. It is made with a catalyzed ceramic flow-through core that removes particulate matter and hydrocarbons from the exhaust stream. These filters do not require ultra low sulfur diesel (ULSD) fuel to perform at peak efficiency. They also do not require maintenance once installed. They are guaranteed to work for the lifetime of the bus.

**Catalyzed Wire Mesh Filters (CWMF):** CWMFs are the newest form of emissions reduction devices. They are a blend of DOCs and diesel particulate filters. Like the DOCs, CWMFs are a replacement for the muffler. The CWMFs contain a wire mesh core that traps PM, HC, and CO. They have efficiencies approaching that of a DPF. The heat from the exhaust converts the pollutants into carbon dioxide, water vapor, and ash. CWMFs do not require ULSD or maintenance.

**Diesel Particulate Filter (DPF):** DPFs reduce the highest amount of emissions from a vehicle. However, they are also the most sensitive of the emissions control technologies. They require ULSD and exhaust temperatures of 220 to 240 degrees Celsius over defined periods of the operating cycle. They also require yearly maintenance in the form of cleaning the core filter. The filter consists of catalyzed ceramic core with forced flow channels that can become plugged by ash if not cleaned properly. EPA standards require 2007 and newer diesel vehicles to feature factory-installed CCFs and DPFs.

\*\*The chart below shows estimated cost and emissions reductions that can be achieved with each of the following technologies when installed on school buses.

Technology	Est. Cost	Maintenance Requirements	Emissions Reductions
CCF	\$700	Yearly changing of filter core	100% at engine emissions
DOC	\$2000	None	PM 20-40%, HC 90%, CO 90%
“DPR”	\$4500	None	PM 75%, HC 75%, CO 75%
DPF	\$7500	Yearly cleaning to remove built up ash	PM 80-90%, HC 50-90%, CO 50-90%

\*Diesel retrofits are very cost effective and provide great emissions reductions. However, retrofitting emergency vehicles are a cause of concern to GDOT, due to the work tasks associated with these vehicles. Different factors come into play when trying to implement a retrofit project of this nature. If your application plans to propose this type of project, please contact us at GDOT for additional information.